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Unsolved Problems of Tuberculosis.—The author discusses a few of the more important and still unsolved problems concerning the fundamental concepts of the pathogenesis and epidemiology of tuberculosis, and emphasizes the fact that permanent control of tuberculosis depends upon the final clarifying of these concepts, which in the light of new knowledge might even result in radical changes in methods of attack. Protection from undue exposure is of paramount importance in the prevention of tuberculosis. Although in most communities from 30 to 80 per cent of the population eventually is infected with tuberculosis, only from 1 to 2 per cent contract active disease. It is therefore as important to analyze why the majority stay well as to discover why the comparatively few become sick. Natural or constitutional resistance would appear to be a real thing, as evidenced by the great variation in susceptibility under similar conditions of infection in individuals, in families and in races. This applies to susceptibility not only to disease but to infection. The question of the possibility of transmission through inheritance of at least a capacity to develop resistance is a live question. The attainment of resistance to tuberculosis, acquired through many years or even through generations of exposure to repeated small doses of infection, may greatly modify the character of the disease and diminish its prevalence. What the epidemiological effect will be of the increasing proportion of uninfected persons and their possible exposure to infection later in life from the residual foci of disease in urban centers is one of the great open questions of the future. Opinion is sharply divided as to whether it is better to have a positive or a negative reaction to tuberculin. If the former, is it better to receive the infection early in childhood or late in adult life? If the latter, what is the danger of contracting an acutely virulent type of tuberculosis rather than a more benign chronic type? If phthisis arises in the main from the inhalation of large or frequent doses of tubercle bacilli, then efforts can be concentrated solely on the prevention of such exposure. If, on the other hand, infections insufficient to cause actual disease leave behind them latent foci capable of reactivation by numerous environmental factors, then these latent lesions assume great importance as the potential sources of phthisis. Many students now believe that they constitute the main factors in the ultimate development of phthisis. The discovery and the management of these potential lesions then become one of the great clinical and public health problems. When activity is discovered early, they respond remarkably well to modern rest treatment, but to detect an early stage requires careful and expert supervision constantly exercised over periods of years. It would appear that the discovery and proper management of latent lesions constitute the greatest opportunity for clinicians to make a real contribution to the prevention of phthisis. The reaction to tuberculin in any given person may change; it may become less or entirely disappear, or it may become more marked. To study a community accurately, periodic repetitions of the tuberculin test would be helpful. These

have not yet been done on a wide scale. The results might be expected to give important information as to the real significance of these changes, their possible relationship to the changing incidence of exposure to infection and their possible relationship to the development of clinical disease. A better understanding of the significance of negative reactions would also be a real contribution to our present knowledge. As a very small percentage of physicians and nurses actually contract tuberculosis even when seriously exposed to infection, it is obvious that other factors than the infection itself are important. The exposure of young people with a negative tuberculin reaction to intimate contact with infection is obviously undesirable. It is at least a possibility that if one could gradually accustom such a person to small properly spaced doses of infection, gradual tolerance to larger doses of infection could be achieved. Also, by careful study of persons having apparently inactive lesions, a basis of judgment as to who is likely to react unfavorably and who is not might be formed. It is also a possibility of the future that some form of vaccination may be perfected which will definitely diminish the danger of disease from contact with infection. BCG in itself has as yet not been proved to be the ideal vaccine. It is applicable only to the uninfected, and for them its efficacy is not yet proved. The future may provide a form of vaccine to be used by means of repeated small injections over long periods for both infected and uninfected persons.—*Some Unsolved Problems of Tuberculosis, J. A. Miller, J. A. M. A., July 9, 1938, cxi, 111.*—(*G. L. L.*)

Course and Mortality of Tuberculosis in Different Age Groups.—The number of primary and early secondary tuberculous lymphoma occurred in a certain relationship to the number of primary infections in different age groups. In 53 cases of uncomplicated cervical tuberculous lymphoma the mortality was 9.4 per cent at ten to thirty years of age. In the 19 cases studied about fourteen years, as a rule, elapsed between the onset of lymphoma and death from pulmonary tuberculosis. In 17 the lymphoma occurred before fifteen years and in 2 between fifteen and eighteen years of age. In only 10 cases out of 1,030 did tuberculous lymphoma precede tertiary pulmonary tuberculosis. Bone and joint tuberculosis usually occurred just before fifteen years of age and in 102 cases the mortality was 27.4 per cent. In 18 cases death from pulmonary tuberculosis occurred sixteen years after a previous onset of bone and joint tuberculosis which later healed. In 9 of these the bone and joint tuberculosis occurred before fifteen years of age and in 9 after fifteen years of age. In only 41 out of 1,030 cases (3.9 per cent) did bone tuberculosis precede tertiary pulmonary tuberculosis. Diffuse peritonitis usually occurred simultaneously with a single or bilateral pleuritis shortly after the primary infection and usually in the age groups between fifteen and thirty, but seldom in children. Mortality was 30 per cent and the duration of the disease short except where lung phthisis arose. Diffuse tuberculous peritonitis occurred only exceptionally (0.7 per cent) with destructive pulmonary tuberculosis. The course and mortality of 792 cases of pulmonary tuberculosis at the Vifilsstader Sanatorium at Reykjavik were studied between 1916–1923. Of these, 413 (133 in men and 280 in women) were closed and 379 (166 in men and 213 in women) open cases. The mortality among the closed cases, from eleven to twenty years, was 20.3 per cent for men and 17.9 per cent for women, and among the open cases 75.3 per cent in men. Susceptibility as regards frequency and primary and secondary stage disease manifestations was generally independent of age up to and probably even after thirty years of age. Resistance to haematogenous spread and progressive infiltration was least in the first years of childhood, as evidenced by the high mortality due to meningitis, and the tendency to multiple haematogenous extrapulmonary localization was greater in the later years of childhood. It is doubtful whether there was an age disposition for the development of tertiary pulmonary tuberculosis. Tertiary destructive pulmonary tuberculosis has a long history which extends over many years. A real morbidity and mortality due to tertiary phthisis cannot become apparent earlier than the tenth year. There is reason to assume that extensive and protracted exogenous superinfection is significant in the development of tertiary pulmonary tuberculosis. However, the importance of endogenous reinfection is even greater, as indicated by these studies where the phthisis occurring in the different age groups was probably of endogenous origin.—*Über den Verlauf und die Letalität der Tuberkulose in den Verschiedenen Altersperioden, S. Magnüsson, Acta tuberc. Scandinav., 1938, Fasc. 2–3, xii, 201.*—(*F. B. S.*)

Incidence of Tuberculous Infection in School Children in Rural Belgium.—The Pirquet test was applied to 534 children, comprising the entire student population between the ages of three and fourteen years

in a village in northern Belgium. The percentage of reactors was 18.0, and varied from 5.5 per cent in the group aged four years to 33.3 per cent in the students aged thirteen years. A study was made of the relation of incidence of infection to the occupation of the parents. A high percentage of reactors (25 per cent) was found among children of restauranteurs, presumably because of increased opportunity for casual contact, while the percentage was approximately 15 in children of farmers, clerks and merchants. There were 133 households with more than one child; in 93 all the children were tuberculin-negative, in 6 all were infected. In the remaining 34 families 36 children were reactors, while 59 children of similar age failed to react. In an attempt to ascertain a difference between the children who reacted and those who did not, the author determined the blood group and sedimentation rate. No significant difference was observed.—*Contribution a l'étude de la primo-infection tuberculeuse parmi la population scolaire de la plaine, H. Van den Eeckhout, Rev. de la tuberc., November, 1937, iii, 1029.*—(*H. L. I.*)

Tuberculous Infection among Soldiers.—The Pirquet test was applied to almost 2,000 soldiers at a training hospital in Lyons. Half of the group were French, and half were natives of Tunisia. Among the latter, the percentage of reactors was 84, while among the French soldiers approximately 78 per cent reacted. After six months of military life, under identical circumstances, 32 per cent of the tuberculin-negative Africans had become positive, while only 21 per cent of the French similarly changed reaction. A group of 52 men who became reactors during the period of observation were carefully studied for clinical or roentgenological evidence of the infection. Two showed questionable abnormalities on the X-ray film; no sign of the infection could be detected in the others.—*La primo-infection tuberculeuse dans l'armée, F. Meersseman, Rev. de la tuberc., November, 1937, iii, 1089.*—(*H. L. I.*)

Trends of Tuberculosis Mortality by Sex.—The mortality from pulmonary tuberculosis by sex and age extending over a period of approximately sixty years was analyzed from the reports of Massachusetts, Rhode Island, Vermont, Michigan, Providence, Rhode Island, District of Columbia and Charleston, South Carolina. It was found that until 1895 the mortality from pulmonary tuberculosis was higher among the females residing in Rhode Island and in Massachusetts than among the males of these states. Subsequently, however, the mortality rate from tuberculosis was higher among the males. Until 1910 the mortality rate was higher among the females living in Michigan and in Vermont, while subsequent to this date the rate was higher for the males. In each of the foregoing states, as well as in Providence, Rhode Island, the death rate from tuberculosis is approximately one-half as high among the females as among the males. This change of the ratio of deaths from tuberculosis among the females as among the males is attributable to a change in the ratio for the groups age thirty and over. The decrease in mortality from tuberculosis among those under five years, as well as among the adolescents and those in the young life period, has remained the same for both females and males. The ratio of female to male mortality changed earlier in communities having a large urban population, while in states having a large rural population the tuberculosis rate remained either higher for females or approximated that of the males. The author concludes that the decline in the tuberculosis rate is in all probability due to improvement in environment and social conditions, and that the more rapid decline in female mortality may be due to the fact that a large proportion of women are employed in the household, and that they have profited more promptly from the improvement in living conditions. Industrial as well as nonindustrial communities showed the same sex differences regarding the ratio of deaths from pulmonary tuberculosis.—*Sex Differences in Trends of Tuberculosis Mortality, C. C. Dauer, Am. J. Hyg., May, 1938, xxvii, 538.*—(*J. D. A.*)

Tuberculosis Morbidity in Italy.—During 1936, 462 tuberculosis dispensaries were in operation throughout the 94 provincial districts into which Italy is divided. Altogether, 742,438 individuals were examined, 595,812 in the dispensaries and 146,626 in the homes, for a total of 1,219,523 examinations, of which 368,108 were for new patients; 70,086 new cases of tuberculosis were found, an increase of 12,670 over the year 1932, and a decrease of 5,561 from the 1934 peak of 75,597. The new cases were classified in the following forms: pulmonary, 44,082; pleuritic, 11,888; osteoarticular, 2,961; glandular, 9,842; and other forms, 1,263. From the point of view of their economic status, 367 of the new cases were classified as well-to-do; 11,398 were in moderate economic condition; 50,087 were classified as poor; while the status of 8,184 was unknown. These figures, however,

may not reflect the true proportions of cases among the three classes, as many of the financially well off were undoubtedly examined and taken care of by private agencies. Only 23,811 of the patients were insured against tuberculosis, while 46,225 were not. A survey was made also of their home conditions, and it was found that 10,558 of them slept alone, 53,159 slept either in the same room or in the same bed with other persons, and 6,319 gave no information; 25,752 of the new pulmonary cases were in the age group fifteen to thirty-four, and of them, 15,139 were in the age group twenty to twenty-nine. Grouped by occupations, the pulmonary cases were divided as follows: nonprofessional occupations, 13,639; workers in general, 13,517; farmers, 7,411; domestics and nonskilled workers, 3,213; army officers, public and private employees, 1,864; tradespeople, grocers, noncommissioned officers, etc., 1,549; transportation and similar, 1,107; liberal professions, teachers and priests, 863. During the same year, 38,161 patients received hospital or sanatorium treatment, an increase of 3,000 over 1934, and 64,200 children were admitted to preventoria, open air schools, etc. The dispensaries also gave pneumothorax treatment to ambulant patients, a total of 119,329 refills having been given. The practice of vaccination against tuberculosis did not come up to expectation, in spite of the official endorsement given to it by the Public Health Ministry, which also offers a bounty to the physicians practicing it. Only 16,370 vaccinations were made during the year, almost all of them with Maragliano's and very few with Calmette's and Petragnani's vaccines.—*Statistica di morbosità nella tubercolosi, Lotta contro la tuberc., September, 1937, viii, 813.*—(*G. W. W.*)

Decline in Tuberculosis Mortality.—Analysis of death rates in the Netherlands showed the mortality from pulmonary tuberculosis in 1930 had declined 57 per cent in males since 1910, and 54 per cent in females. The decline was most marked between the ages of one and fourteen years, and least between the ages of fifteen and thirty-nine years and over the age of sixty years. The drop was more marked in males at most age periods. Comparison of the urban and rural populations showed that whereas in 1910 the urban death rate considerably exceeded that of the rural population at almost every age, in 1930 the urban death rate was much the lower. The decrease was particularly striking in cities of over 100,000 inhabitants, below the age of fifteen years and above the age of forty.—*La regression de la mortalité tuberculeuse, D. K. Rykels, Rev. de la tuberc., March, 1938, iv, 331.*—(*H. L. I.*)

Tuberculosis in New Zealand.—In New Zealand the responsibility for the care and treatment of the sick, with the exception of mental diseases, is vested in Hospital Boards, elected every three years on a parliamentary franchise, each with a well defined district, the revenue being derived partly from local rating and partly from general government subsidy. The first official measures against tuberculosis were taken in 1901 when pulmonary tuberculosis was made notifiable and a small sanatorium opened in the North Island under government control. A Public Health Department was created, its efforts devoted chiefly to prevention, the question of treatment being left to the various Hospital Boards. In the four largest towns there is a special institution for advanced cases, earlier cases being sent to five sanatoria, located in more favorable surroundings. There are in all 625 beds for early cases and 385 for advanced cases, a total of 1,010. This makes one bed for 1,500 inhabitants (total population 1,500,000) or two beds per annual death and more than one per annual notified case. The tuberculosis mortality is possibly the lowest in the world, 33 per 100,000 in 1934, being reduced from 75 per 100,000 in 1900. Tuberculosis is much more prevalent among the natives than among Europeans, and notifications very imperfect; over 90 per cent of all deaths occur in those with more than half Maori blood. The tuberculosis mortality rate among Maoris is 494 per 100,000, compared with 42 per 100,000 Europeans for 1934. Living conditions among them are poor, overcrowding common and sanitation elementary. Maoris resist institutional confinement.—*Tuberculosis in New Zealand, I C. MacIntyre, Brit. J. Tuberc., January, 1938, xxxii, 5.*—(*A. P.*)

Tuberculosis in Two Norwegian Forest Districts.—The danger of infection with tuberculosis is greatest at adolescence and especially in the age group of twenty to twenty-five years. In thinly populated rural districts the incidence of tuberculous infection among children served as a good indication of the infection in adolescents and the incidence of the known and unknown sources of infection among the population of the district. Where all the children in a family reacted to tuberculin the source of infection was usually found in the home. In families where the incidence of tuberculosis was one and a half times that of the

general population, the percentage of tuberculin positive reactors was twice as high. The state preceding tuberculosis also occurred more than twice, and all degrees of pulmonary tuberculosis occurred three and a half times as frequently as the average in all the studies. If the Pirquet test was given first and then the Mantoux test with 1 mg. tuberculin in those who were negative, about 20 per cent more positive reactors were found with the latter. The percentage missed by the Pirquet test was greatest among the less sensitive individuals, namely, among those vaccinated with BCG or those with early infections. A very accurate Röntgen method was used in which only 3.4 per cent error occurred in 224 cases studied. All forms of pulmonary tuberculosis were studied and early cases were compared with similar cases from a clinic in Oslo and from a private practice. Of 5,760 persons studied 1.2 per cent showed an early unrecognized pulmonary tuberculosis.—*Erfahrungen und Ergebnisse, Gewonnen bei Massenuntersuchungen auf Tuberkulose in zwei Norwegischen Waldbezirken, G. Hertzberg, Acta tuberc. Scandinav., 1938, xii, 34.*—(*F. B. S.*)

Tuberculosis Problem in Industry.—Tuberculosis workers in Great Britain can look with considerable satisfaction upon the steady decline in incidence and mortality rates over the last thirty years. The present limitations are largely the result of social factors. Among the greatest of present day needs are improved facilities for after-care. In effect, after-care must be carried out in industry. Enlightened industry now generally realizes that it must carry a certain number of subnormal individuals and neither expects nor desires to jettison its handicapped workers immediately. In the long run this is not a sound economic policy for it means constant loss of trained employees and psychological unrest. The source of the material in the present study is a questionnaire answered by 24 full-time medical officers in all types of industry excepting coal-mining and shipbuilding. It represents more than half a million workers, or about 5 per cent of the total British industrial population, a highly selected group, in that they are from larger and more socially interested industrial organizations. Most difficulties encountered may be said to be inherent in the nature of the disease tuberculosis, which is both insidious and infectious, and leaves its sufferers incapable for a long period of normal physical effort. First comes loss of income, involving possible break-up of the home. Continuation of part-time wages, or frank subsidy helps here. Reluctance to accept treatment and temptation to cut it short are grave difficulties which can only be overcome ideally by providing for the wage-earner's family during his absence from work, a specially necessary provision in tuberculosis since a good standard of living is so important both for patients and contacts. D'Arcy Hart, in his 1937 Milroy Lectures, suggested the advisability of creating a special insurance fund for this purpose. Environmental difficulties are familiar to all practitioners in working class areas. Home conditions are often appalling. Slums, overcrowding and undernourishment are vitally important factors. Another difficulty, which is often aggravated by rehousing schemes, is that of travelling. In many large towns and cities workmen must travel for miles in crowded buses or trains and the extra effort may be the last straw in causing a breakdown in a tuberculous patient. Fear is an important factor. It may be fear of loss of income, loss of a job or fear of the sanatorium. Only one of 24 firms questioned summarily discharged patients with tuberculosis. There are also difficulties in teaching patients of low mental calibre what treatment means and how and why it must be continued. Some patients are uncoöperative in that they may refuse alternative work on their return, considering it beneath them. There is the fact which must be squarely faced, that the returning tuberculous patient has a greatly reduced efficiency and from the viewpoint of physiological output is considerably inferior to the normal worker, an inferiority which may persist for years. He needs a sheltered life and a job not involving much physical exertion. Obviously such a worker is unlikely to be welcomed by a shop foreman, but most good employers are willing to take back into their employ their own workers who have been under treatment for tuberculosis providing there is a prospect of their eventual return to reasonably good health. However, no industrial concern, with the best intentions, can carry too large a proportion of "crocks." The skilled tradesman or worker can usually return to his trade and many clerks and factory workers do not have too onerous jobs, although their hours of work must be restricted with at times an extra hour of rest in the middle of the day. This, of course, introduces complications, especially where workers are paid according to group output. Unsuitable work may be due to any of the following reasons: (*1*) atmospheric and environmental conditions, such as excessive dust, heat, humidity; (*2*) excessive physical exertion

in heavy manual labor. Open-air jobs should not be thoughtlessly advocated. One great trouble is that the middle aged, whose prognosis is better, may be unadaptable, while the young, who are more often adaptable, may break down anyway. One large organization has a scheme for scheduling all light jobs and returning these to a central labor department where the openings are catalogued. However, most of these places are quickly filled. Wages must often be reduced, entailing hardship. In such cases, so-called Care Committees could render very valuable emergency aid by granting temporary subsidies. There are probably few suitable occupations for positive-sputum cases since one's first duty is to other employees and chances cannot be taken. In such cases village settlements seem to be about the only hope. Over 60 per cent of Lane's cases were at work, two-thirds having been absorbed over five years and being on full productive work. Bashford and Scott's cases (1936) showed 25 per cent surviving ten years, Lane's 40 per cent for five years. Of 10,500,000 British industrial workers, 56 per cent are employed by small firms (less than 250 employees). The problem here is to get the medical facts in the hands of the management who can then discuss individual cases. For large organizations the Tuberculosis Authorities should make the necessary contacts and part-time medical officers may bridge the gaps.—*Difficulties Encountered in Industry in Dealing with the Tuberculosis Problem, R. E. Lane, Tubercle, December, 1937, xix, 97.*—(*A. P.*)

Social Importance of the Modern Sanatorium in Italy.—Everyone agrees that tuberculosis should no longer be cared for at home and that a period of sanatorium residence, where appropriate education as to conduct of life and diet can be obtained, is essential. In the sanatorium too, the patient learns about the public health aspects of tuberculosis. Sanatoria located near large cities have the advantage of a readily accessible clinical medical personnel that can act in a consulting capacity to the pthisiologist. The location of a sanatorium near the city is helpful in inducing patients to be hospitalized when they are reluctant to leave their families to go to distant sanatoria. Not all patients are suitable for sanatorium residence. Careful selection of patients is necessary. Patients who will probably die within a few months should not be sent to a sanatorium. Having to remain permanently in bed while other patients are on graduated exercise impresses the patient with his hopeless condition. The other patients are alarmed and discouraged by the sad spectacle of the very sick and dying patients and tend to lose their faith in the cure. Sanatoria were originally designed to give hygienic and dietetic treatment. Modern therapy, mechanical in nature, has not lessened the importance of the original treatment for it must be remembered that the biological reactions play the most important rôle. To-day, as yesterday, the secret of success of the sanatorium resides in the medical personnel. The sanatorium doctor should be a trained phthisiologist, trained in a highly ranking institution. The Carlo Forlannini Institute is a model sanatorium of this kind. There, it is demanded that the sanatorium physician be a good clinician, that he know physical diagnosis and common laboratory tests. He must know how to read X-ray films and must know collapse therapy. The sanatorium provides a place for the phthsiologist to acquire his specialty. The medical director in a sanatorium should not have to attend to everything and be responsible for every little extramedical event, and be absorbed by all the little administrative details which may detract him from necessary duties. He should have at his disposal some responsible people to manage the material responsibilities connected with the economic needs of the sanatorium. In the Italian sanatoria all forms of surgical collapse therapy are performed and the patient is given the benefit of clinical observation before and after such treatment. It is unwise to send to the sanatoriums patients with the following types of tuberculosis: acute general miliary, caseous pneumonia, galloping tuberculosis, acute bilateral extensive fibrocaseous pulmonary tuberculosis where pneumothorax has been impossible, cachectic tuberculosis or amyloid disease, chronic pulmonary tuberculosis with stabilized stationary lesions, tuberculous meningitis, very serious laryngeal tuberculosis and intestinal tuberculosis. Some phthisiologists separate negative sputum from positive sputum cases in the sanatorium. This seems unnecessary and of little value, for in a well managed and directed sanatorium the risk of infection is minute, and it is exclusively connected with education and with the different and mutual attitudes of the patients. In the authors' sanatorium, it has never been proved that a case of a patient with negative sputum, hospitalized for a long time, has ever been infected.—*L'importance sociale du sanatorium populaire moderne in Italie, G. Ferrando & A. Rabino, Arch. méd. chir. de l'app. respir., 1938, xiii, no. 2, 81.*—(*J. E. F.*)

Tuberculosis in Canadian Hospital Workers.—This paper was presented before the Tuberculosis Section of the British Medical Association in Belfast, Ireland, July 21, 1937, in discussion of Dr. Peter Edwards's paper which opened the session. The data were summarized from the answers to a questionnaire sent to all tuberculosis hospitals in Canada, three-fourths of which answered. It would seem that the majority of directors prefer positive reactors, two-thirds being in this class. Only one-fourth insist on the nurse having a positive tuberculin test. In the sanatoria, which take only graduate nurses to make up the largest percentage of their personnel, the nurses are almost all positive reactors, having become infected before or during their undergraduate course. In general hospitals with a tuberculosis section undergraduates, and hence a larger number of negative reactors, come into contact with the disease. The experience of the mental hospitals of Ontario is that under such conditions the negative reactor is at a disadvantage, developing lesions and of a graver type in greater proportion as compared with the positive reactor. All nurses entering tuberculosis service in Canada are either tuberculin tested and X-rayed if positive, or all are X-rayed without a preliminary tuberculin test. The X-ray films are repeated at yearly intervals or oftener if indicated; the tuberculin tests are repeated on the negative reactors every three months until they become positive whereupon they are X-rayed. All directors agreed that there should be more stringent regulations for the detection of the tuberculous patient in the general hospital who is being treated for some condition other than the tuberculosis, for such cases are responsible in large measure for infecting the uninfected undergraduate nurse. All hospitals take care of the nurses who are infected while in their employ, but there is no compensation granted, nor is there any during the period of convalescence outside the hospital. In the discussion following the paper, it was stated that Canada appeared to be far ahead of England in the care exercised in choosing the nurses for tuberculosis work, in the conditions under which they worked, and in the care given them when they broke down with the disease while on service. (British Medical Journal, July 31, 1937, page 239.)—*Tuberculosis in Hospital Workers, A Summary of Canadian Data, Madge T. Macklin, Tubercle, February, 1938, xix, 193.*—(*C. C. M.*)

Tuberculosis in Hospital Personnel.—Studies have been made of the student nurses in three private hospital schools of nursing. In each of these schools tuberculin tests have been made on every probationer as soon as possible after her entrance to the school. The positive reactors have had immediate roentgenograms of the chest. If this examination is negative or reveals a primary complex, the student then has a chest film made annually as long as she remains in the school. Those who react negatively to the tuberculin test have the test repeated every six months as long as it remains negative, or follow the course prescribed for positive reactors if they become positive to tuberculin. In school I, in which each student is required to work three months in the tuberculosis division, there were 22.82 per cent positive reactors among the entering students and, on graduation, 94.33 per cent reacted positively. In school II, in which tuberculous patients are admitted to the general hospital, 23.88 per cent of the probationary students reacted positively and, on graduation, 43.56 per cent had positive reactions. In school III, in which similar arrangements for tuberculous patients were made, 23.63 per cent of the entering students and 35.32 per cent of the graduates were positive reactors. A control group of students of similar ages and environment was found in the School of Education at the University of Minnesota. Among the entering students of this school, 24.8 per cent were positive reactors while on graduation only 28.5 per cent were positive. The sources of infection are patients with tuberculosis, either known or unknown, fellow students, and members of the nonprofessional personnel with tuberculosis. It is recommended that every hospital routinely examine for tuberculosis all nurses, members of the professional and nonprofessional staffs and patients immediately upon admission. There have been numerous methods proposed to immunize individuals against tuberculosis but none of these are of proved value. Therefore, it is evident that professional and nursing students must be protected from the disease by the institution of strict contagious disease technique in the care of the patients. The safest procedure from the standpoint of the student nurse is to keep her from coming in contact with tuberculous patients while in training. This can be done with no loss to her future efficiency as a nurse. Furthermore, only graduate nurses should be employed in the care of tuberculous patients and such nurses should take graduate training in the fundamentals of tuberculosis before engaging in active care of patients. The compensation of these nurses should be commensurate with their expertness in this field and with the

hazard of the environment.—*Tuberculosis in Medical and Nursing Hospital Personnel, J. A. Myers, B. Trach, H. S. Diehl & Ruth E. Boynton, Ann. Int. Med., June, 1938, xi, 2181.*—(*A. A. E.*)

Pneumonia and Tuberculosis among Industrial Workers.—There is need for intensive study and research before the exact influence of industrial hazards is understood. The members of the Industrial Hygiene Section of the American Public Health Association should make the needed studies and give the information so gained to those responsible for the laws intended to protect industrial workers. Industry stands ready to protect its workers once the hazards are authoritatively pointed out. It is almost certain that the interest of industry would render protective legislation superfluous in the presence of exact knowledge of its needs. This eleven-year study in an Alabama mining community, with a population of 77,000, deals with four groups: (*1*) dependents, including all males under sixteen years and dependent females of all ages; (*2*) surface workers, that is, all employees who work above ground; (*3*) coal miners, that is, all underground workers in coal mines; (*4*) ore miners, that is, all underground ore mine workers. A comparison is made between the mortality rates from pneumonia and tuberculosis for whites and blacks and males and females, in each of the four groups. The pneumonia results are shown graphically by figures and tables. *Summary:* It required 1,554 dependents each year to furnish one pneumonia death and 2,965 for each tuberculosis death; of each 663 surface workers one died yearly of pneumonia and one out of 1,769 died of tuberculosis. Coal miners had one annual death from pneumonia out of 803 persons and one death from tuberculosis out of 687, while 385 ore miners contributed one annual pneumonia death and 807 ore miners one tuberculosis death.—*Pneumonia and Tuberculosis among Industrial Workers and Their Dependents, C. H. Kibbey, Am. J. Pub. Health, June, 1937, xxvii, 555.*—(*S. O. P.*)

Bovine Tuberculosis in Humans in Great Britain.—Recent findings and research prove beyond doubt that bovine tuberculosis is a serious menace to be vigorously combated, yet public opinion is surprisingly apathetic, despite reports by a Royal Commission, the Ministry of Health, the People's League of Health, and the efforts of individual workers. Great Britain still has a milk supply that is infected in 5 to 12 per cent or more of samples of ordinary churn milk, and more than one-third of the milk cows are tuberculous. In September, 1936, 9 of 36 samples going into towns in the south of England contained tubercle bacilli and about the same time in northeast Scotland 40 to 90 per cent of cows in six milking herds in Banffshire reacted to tuberculin, using the double intracutaneous test. In one small district alone, 15 of 53 cows condemned under the Tuberculosis Order showed udder tuberculosis. Without a bacteriological examination one cannot say to which type—human or bovine—a case of tuberculosis is to be attributed. The number of type determinations made has been relatively small because the workers in this field are few. However, their work since 1911 has been practically continuous. English statistics compiled by Eastwood, Griffith and Menton show 50 per cent of cervical lymph node tuberculosis at all ages to be of bovine type, and nearly as high a proportion of lupus. Meningeal tuberculosis is about 25 per cent bovine in type, bone and joint and genitourinary tuberculosis slightly under 20 per cent. Scottish statistics, compiled by Blacklock, Griffith, Munro and others, show about the same ratio for cervical node tuberculosis and nearly 70 per cent for lupus, also about 30 per cent for bone and joint and genitourinary tuberculosis and meningitis. Regarding lupus, only about one-third of the strains were typical, the others being more or less attenuated. Up to 1922 only four persons, two in England and two in Scotland, had been found with bovine bacilli alone in the sputum, suffering from pulmonary tuberculosis, of which three were discovered and reported by Griffith. But in 1922 Munro and collaborators observed two dysgonic strains among 100 from sputum collected for testing and these proved of bovine type. The explanation of the few previously discovered pulmonary cases of this type is, not that such cases were rare but rather that search was made in those parts where bovine infection is least common, namely, the southeast of England and among urban dwellers. Later inquiries instituted in the rural districts of Fifeshire by Munro and in the north of England by Cumming brought to light many more cases. In this new era a total of 159 bovine pulmonary cases has been found in Great Britain, bringing the grand total to 163. Both in Denmark (Jensen) and Holland (A. C. Ruys) bovine bacilli have been found in the sputum of an appreciable proportion of pulmonary cases, those in Denmark being most numerous in west and south Jutland, corresponding with the prevalence of tuberculosis in cattle. In Germany,

B. Lange has cultivated bovine bacilli from 12 cases, all "cattle contacts." In Great Britain the bovine percentage in pulmonary tuberculosis rises gradually from south to north, being highest in the rural districts of northeast Scotland. In contrast to this, Cumming found no bovine cases among cultures from 320 cases in Ireland, although 97 were "cattle contacts." In Scotland the epidemiological features associated with bovine tuberculosis are a relatively high proportion of the attacked being children and females, suggesting to Hill and Menton milk-borne bovine infection. The inception of the disease is in the great majority before the age of twenty-five. No case can be distinguished clinically or roentgenographically as being of human or bovine type. There is a laboratory sign of distinct value on ordinary stained smears, that is, when the bacilli are mostly short and uniformly stained, often in little clumps, the culture will almost invariably be bovine. The converse, however, does not necessarily hold. The evidence was overwhelmingly in favor of an alimentary channel of infection in 62 cases, doubtful in 100. In recent years, several cases in children, mainly Scottish, have seemed to indicate the respiratory tract as the portal of entry and the distribution of lesions was identical with that of the ordinary human type of infection. So far no direct link has established the proof of air-borne bovine infection and evidence indicating human transmission of bovine bacilli is difficult to obtain. So far there is only one reasonably sure instance of familial bovine type infection, reported by Munro and Griffith. The almost complete lack of proof of transmission of bovine bacilli from human to human may be partly due to the slight infectivity of many of the cases, bacilli not being very numerous in their sputa. Since B. Lange in 1929 began to determine in Germany the types of tubercle bacilli in cases of pulmonary tuberculosis among those in contact with cattle, no direct evidence had been adduced of direct infection of man. Added to this, Cumming, among 29 pulmonary cases among "cattle contacts" in the north of England, found 13 expectorating only bovine bacilli. None of these gave a history of previous glandular tuberculosis. From the above facts, compulsory pasteurization of all ordinary milk going into the larger towns is urged. For the inhabitants of rural and small urban areas, home pasteurization or boiling should be advised.—*Bovine Tuberculosis in Man, A. S. Griffith, Tubercle, September, 1937, xviii, 529.*—(*A. P.*)

Tuberculin Reactions in Children.—In a study of 1,264 measured tuberculin reactions, no positive correlations could be found between the size and intensity of the reactions and the location of tuberculous disease, the size or activity of the lesion, or the prognosis. The reaction to the intracutaneous tuberculin test tends to vary in size and intensity with the size of the dose and with the age of the child. There is no sex variation in the size and intensity of the reaction when age and dosage are constant. The initial dose should not be more than 0.01 mg. and a negative test should mean negative to 1 mg. Definite criteria as to size of reaction and time of reading must be adhered to if false reactions are to be eliminated. Tuberculin dilutions up to 1:10,000 are relatively stable, and dilutions need not be made more often than once a month. Syringes and needles should be used for tuberculin testing only and separate ones kept for the various dilutions. A positive tuberculin reaction is unlikely to become negative within the span of childhood, and this is even less likely to occur in cases in which there has been a diagnosis of clinical tuberculosis than in cases in which the positive test has been the only manifestation of tuberculosis. It is usually unnecessary and undesirable to repeat a tuberculin test during childhood if a tuberculin test has once been positive, as the test only rarely becomes negative during these years. There has been a marked decrease in the number of infants infected with tuberculosis in the series studied on the Children's Medical Service of Bellevue Hospital in the past seven years as compared with a similar preceding period.—*Tuberculin Reactions in Children, Edith M. Lincoln, Antoinette Raia & Lilian Gilbert, J. Pediat., April, 1938, xii, 479. (Author's Summary)*—(*M.B.*)

Tuberculin Allergy in the Aged.—Three hundred and fifty-three men between the ages of fifty and ninety-two were studied by means of intracutaneous injections of 0.1 mg. of OT. Of these 96 per cent had positive reactions.—*The Incidence of Tuberculin Allergy in Old Age, Camille Kereszturi, Esther Goldberger & Kimi Nojima, Quart. Bull. Sea View Hosp., April, 1938, iii, 260.*—(*A. A. E.*)

Aspects of the Tuberculosis Problem.—A plea is made for unified control and responsibility for the organization of tuberculosis work, whether in the home or at an institution, from the time of notification through the various phases of the disease, emphasizing the necessity for close contact

and coöperation with various public and private agencies and bodies. The value of propaganda is discussed. It must be skilful, especially when the social class appealed to is unable to appreciate readily its significance. The sort of half knowledge which inspires disquiet and dread, creating fear of the consequences of medical examination, is a total loss practically. It should be realized that the difficulties connected with the diagnosis of pulmonary tuberculosis at an early stage may be great and require most careful coöperation to unravel. Sutherland emphasizes the importance of early and adequate treatment of so-called "simple pleural effusion." Cases in elderly people should be notified without delay in order to avoid familial infection. In Manchester, the Tuberculosis Officer administers a fund of over £4,000 ($20,000) per year in care work, which includes grants of food to maintain families whose breadwinner is under treatment or to supplement the patient's resources before or after institutional care. No actual money is given, as this may lead to premature termination of treatment. Assistance is given in arranging a proper dietary by printed instructions. Preferential considerations have also been secured for families to obtain better homes in more suitable surroundings. It is common experience that there is a selectivity in resistance and that the first prognosis should be one of cautious optimism, unless the case is hopelessly advanced. An initial haemoptysis is less grave than an initial pleural effusion. Usually a final prognosis is best deferred pending observation for some months.—*My Chief Difficulties in Dealing with the Tuberculosis Problem, D. P. Sutherland, Tubercle, January, 1938, xix, 166.*—(*A. P.*)

Tuberculosis Prevention in Detroit.—Education is the bulwark of health promotion and disease prevention. The modern conception of a well organized health department is one in which health education and administration are closely coördinated. To achieve results, the health officer must not only give the public the newer knowledge of health promotion, but he must provide the facilities to make such services universally available. Every public health worker enhances his usefulness to his community by improving his knowledge of the techniques of health education. The span of health education begins with statistical facts and extends through the preparation of the professional and educational groups who should influence the behavior of those fractions of the public in need of a specific health service. It must include the availability of services of physicians and dentists, whose offices become health centres for making health services universally available. Statistics, preparation, and availability, regardless of the financial status of the individual, are all necessary to complete the span of health education and public health administration. For example, the modern health department must tell the public repeatedly that tuberculosis is a communicable disease. The family physician must be told repeatedly that minimal tuberculosis cannot be diagnosed early on the basis of symptomatology. With this information in hand, the health department must proceed to the preparation of those groups which are to participate in the dissemination of facts, and those fractions of community in greatest need of this knowledge. Our purpose is to stimulate such a response in the individual that will create a health attitude that will bring him voluntarily to seek the service suggested in his interest or for the well-being of his household. Every physician must be a deputy health officer. In Detroit this principle has been applied with good results. Nine years ago the health department deputized 1,200 physicians in a coöperative health plan. During the past two years practising physicians immunized all but 18 per cent of children known to have received protection against diphtheria. The value of the service has been intensified by a full-time Director of Medical Relations, who stimulates the interest of the family physician, selects coöperating physicians on the basis of ability to render adequate service, and gives instruction to undergraduates in medical schools. The service is further augmented by adequate nursing personnel. It was decided to apply the same principle to tuberculosis work. During the past two years, following a long, intensive publicity campaign, the health department has concentrated its efforts on contacts, suspects and persons living in areas of high tuberculosis mortality. Up to July 1, 1937, 41,434 persons received the tuberculin test by the physician of their choice; 10,010 of them (24.2 per cent) reacted positively. Of this number, 7,403 had chest X-ray films, with the discovery of 207 new cases of active tuberculosis; 145 of these have been, or are being, hospitalized. This program has been made possible by larger appropriations of money and the coöperation of 1,000 practising physicians, who report tuberculin tests and X-ray findings to the health department. In brief, there has been added to a conventional health program a more specific nursing educational service, operating under a medical participation plan which makes the service available in a thousand

offices of private physicians, notwithstanding the financial status of the individual. Public health nursing seems essential, and two nursing visits seem best.—*Results of Mass Education for Tuberculosis Prevention in Detroit, H. F. Vaughn, G. E. Harmon & J. G. Molner, Am. J. Pub. Health, November, 1937, xxvii, 1116.*—(*S. O. P.*)

Control of Tuberculosis.—The crude mortality from tuberculosis in 1933 was less than one-third of the rate in 1900. Some reasons for doubting that the rapid decline of tuberculous mortality during the last fifty years has been due principally to the measures taken to prevent infection are: (*1*) the isolation of open cases of tuberculosis is not complete even in areas with best sanatorium facilities; (*2*) the decline in mortality is not limited to those areas where vigorous control measures have been taken; (*3*) the disease has declined greatly, but tuberculous infection remains high. Protection against exposure to the tubercle bacillus may prove harmful unless kept up throughout life, because relative isolation postpones first infections from childhood to adult life when most manifest disease occurs. The limiting conditions for the tubercle bacillus are: (*1*) that to escape from the host it must cause a lesion which breaks through to the surface, and (*2*) that it succeeds in producing such lesions in only a limited number of infected persons. This explains why tuberculosis is amenable to control by isolation of the sputum-positive cases. For eventual eradication of tuberculosis it is only necessary that the number of infectious hosts be reduced. The biological balance is against the survival of the tubercle bacillus in this country. Two forces may possibly reverse the downward trend of tuberculosis: (*1*) a decrease in human resistance, and (*2*) some change in the adaptation of the tubercle bacillus to its host tending to favor survival of the parasite. We should prepare to eradicate tuberculosis in the belief that it is not permanently engrafted upon our civilization. A comprehensive tuberculosis program should embody the following principles: (*1*) the isolation in sanatoria of all known cases of the disease, such isolation to be continuous as long as cases are open, (*2*) adequate medical care for the known active cases, (*3*) more vigorous effort to find cases of tuberculosis earlier, and (*4*) special protection, including medical care and financial aid, for those groups most imminently endangered by tuberculosis. Isolation of known open cases is the most direct method for reducing the prevalence of tuberculosis in our environment. Nowhere is generous financial aid more urgently needed or better justified than in the families of the tuberculous poor who bear the double risk of intimate exposure to the tubercle bacillus and poverty. The tuberculosis program should be concerned with raising the standards of living of those groups most in danger of tuberculosis, beginning with the families of the tuberculous, and extending thence as far as practicable. Adequate measures both medical and social should be imposed to remove intimate exposure and poverty, the two conditions which most favor tuberculosis. This implies more than just medical care and hospital beds. As the cases become fewer, preventive measures should be centred upon the open cases. The protection thrown around these infectious cases and their immediate contacts should be progressively increased. The program must differentiate between the most sheltered and the most exposed groups of our population. As the menace of tuberculosis becomes less imminent, the public will take less interest in general protective measures. But as the disease becomes more infrequent, we may be assured that public opinion will not only support but will demand more rigid isolation.—*How Much Control of Tuberculosis? W. H. Frost, Am. J. Pub. Health, August, 1937, xxvii, 759.*—(*S. O. P.*)

Tuberculosis Problem in India.—Certain villages show a high incidence of tuberculous infection yet a surprisingly small amount of actual disease, others are not only heavily infected but have severe types of the disease. Social and hygienic factors appear to play a far less important part in producing the severe exudative type lesions met with than is commonly supposed. The factor or factors leading to development of active disease from infection seem to cut across differences of race, economic status and living conditions Hence, the need for a critical study of India itself, which must necessarily take years. Meanwhile the uncritical introduction of a campaign based solely on European experience might lead to great disappointment. Whereas in the West the tuberculosis clinic is one of the most important links in the campaign, in India the money spent on such clinics may be out of all proportion to their value because of the lack of facilities for treatment of cases discovered. Ambulant treatment of the severe types of tuberculosis is not only impossible but dangerous. Likewise, to establish colonies and admit directly from clinics is equally disastrous for the full value of colonies is obtained only when working in conjunction with hospitals and sanatoria. The more severe the disease, the more necessary is preliminary treatment and

preparation. Such an investigation as suggested should be along two lines: (*1*) determination of the actual incidence of infection and disease in various localities, (*2*) a study of the methods of combating the disease and those best adapted to conditions in India. Special areas, rural and urban, should be selected.—*The Tuberculosis Problem in India, C. Frimodt-Möller, Brit. J. Tuberc., January, 1938, xxxii, 11.*—(*A. P.*)

Tuberculosis in Infants.—With the purpose of throwing light on the prognosis of tuberculosis occurring during the first year of life, a critical study was made of 78 infants under treatment with tuberculosis during the past four years at St. Ultan's Hospital, Dublin, Ireland, of whom 60 died and 18 recovered, a mortality of 77 per cent. The infant shows little resistance to tuberculous infection, partly because of inability to get away from the source, most often the mother, and partly because its defense capabilities are low during these early months and inherited immunity is negligible. The picture is that of an unhealed primary focus and the greatest danger is of its developing into acute miliary tuberculosis or meningitis. There are three stages, (*1*) extensive lymph node enlargement, (*2*) miliary spread to meninges or lungs, and (*3*) perifocal caseation in the lung consisting of caseous pneumonia, cavity forming at the site of the primary focus. All excepting the primary focus are fatal during the first year of life, but after this the picture is somewhat modified, less tempestuous and the lymphatic defense is more successful. In later childhood, adult type phthisis may occur. It is assumed that a positive tuberculin test in an infant indicates an active lesion and 16 consecutive necropsies added further proof, in addition to the history of home contact in 70 per cent of cases. *Fatalities:* Of these, 22 were pulmonary, 18 miliary pulmonary, 17 tuberculous meningitis, 2 abdominal and 1 congenital. Fifty-seven deaths occurred from inhalation infection and in all but 2 a hopeless prognosis was possible within a few days. Only primary foci were noted to heal; there were 18 such, of which 12 showed complete roentgenographic healing and the others are expected to do likewise. *Diagnosis:* This was made on three grounds, (*1*) positive tuberculin test, (*2*) chest X-ray picture and (*3*) contact history. Physical examination is misleading and the more one hears the less likely it is to be due to tuberculosis. Cough is uncommon but, when present, may be of a hoarse barking type due to glandular pressure. Fever is also uncommon. The X-ray picture is most important if one knows what to look for, for example, primary lung focus, infiltration or enlarged mediastinal nodes. The focus may be concealed in the midst of an infiltration. The nodes affected may be either hilar or paratracheal and may or may not be associated with a visible primary focus. They may appear as a ribbon shadow on either side of the trachea due to displacement of vessels. Transitory enlargement occurs with bronchitis or pneumonia. Lateral views may help to visualize them. The primary infiltration is in the nature of a noncaseous exudation and rarely remains over two months, whereas "epituberculosis" lasts much longer and is usually denser. If diagnosed in the primary stage, prognosis is favorable if complete removal from infection is done at once. It is also fair when the infiltration is localized and hilar nodes only involved, much less so if infiltration is widespread or caseous pneumonia commencing or massive glandular involvement. Infection of paratracheal nodes means the risk of blood-stream dissemination. *Treatment:* First and most important is removal of infants from all possible contacts. They should never be put in institutions with open cases. Healing is by calcification or fibrosis, the first less common. Caseating foci portend a fatal termination. Healing occurs in mild cases in six months but may take two years. A fall of the blood sedimentation rate to normal is a favorable portent. The second essential is bed-rest. Fresh air within reasonable limits is also important. Strong sunshine or ultraviolet radiation are contraindicated in all pulmonary cases but moderate exposure in spring and autumn is safe.—*Tuberculosis in Infants, D. Price, Brit. M. J., February 5, 1938, no. 4023, 275.*—(*A. P.*)

Tuberculosis in Children.—It is now well established that the number of tuberculous children with bacillary gastric contents, by animal inoculation, is much greater than was formerly suspected. This applies not only to children with cavitary lesions but also to those with benign infiltrations. In cases presenting only a positive tuberculin reaction or evidence of hilar lymph node involvement, the number of positive gastrics is much smaller but still significant; in 148 such cases, there were 17 with positive gastric contents. It is of great importance to know whether all these positive cases are dangerous with regard to transmission of the disease. Laryngeal smears were, therefore, carried out on 140 tuberculous children. Most of the children coughed during the process so that the material obtained was composed of mucus from the posterior laryngeal wall and

bronchial droplets. Repeated smears were made, particularly during periods of temperature elevation or upper respiratory infection. The material was examined directly and also cultured on Petragnani's medium. There were 67 children up to five years of age. Twenty-five of these had large perifocal infiltrations; 23 had positive laryngeal smears and 2 were negative. The remaining 42 were either simply tuberculin positive or showed evidence of hilar lymph node tuberculosis; all of these had negative laryngeal smears. All of the 25 cases, with the perifocal infiltrations, had positive gastrics; one-third of the remaining 42 had positive gastric contents, on animal inoculation. There were 73 children above five years of age. Twelve of these had pulmonary infiltrations of varying size, but were afebrile; 2 of these had positive laryngeal smears, and several had positive gastrics. The remaining 61 presented either tuberculin sensitivity or active or inactive bronchial lymph node tuberculosis; all of these had negative laryngeal smears. These results show that there is one group of small children, those with large perifocal infiltrations, which has a high percentage of positive laryngeal smears. This group must be considered as dangerous and must be isolated from other children. The other group of small children, in spite of the finding of occasional positive gastrics, need not be regarded as dangerous. These conclusions are based upon the fact that any child with tubercle bacilli in its larynx can spread the organisms by coughing. The older children, as grouped above, are also not to be considered as dangerous, in spite of the finding of bacillary gastric contents. These conclusions do not apply to any cases in which there is evidence of breaking down of the pulmonary lesion.—*Untersuchungen über die Möglichkeit der Tuberkuloseübertragung durch Kinder, A. Viethen, Klin. Wchnschr., August 20, 1938, xvii, 1186.*—(*H. R. N.*)

Tuberculosis in Children.—Surveys were made of the inmates of two homes for the cure of homeless and destitute children. In all 1,545 children were examined by means of the Mantoux test; of these 427, or 27 per cent, were found to be positive reactors. These children then had chest roentgenograms and only 36 were found to have abnormal shadows in the chest. Only one had active pulmonary tuberculosis; the remainder had healed primary complexes, thickened pleura, or abnormal configuration of the ribs. In 411 adult workers similarly studied no case of active pulmonary tuberculosis could be found.—*Pulmonary Survey of Two Protectorates in the Borough of Richmond, M. Kornat, Quart. Bull. Sea View Hosp., July, 1938, iii, 375.*—(*A. A. E.*)

Tuberculosis among Children and Young Adults in Cattaraugus County.—From a tuberculin study of 1,183 pupils, the majority between ages ten and sixteen, the author concludes that tuberculosis in this age group is rare, that reinfection tuberculosis before adolescence is infrequent, that primary tuberculosis is mild, and that the incidence of tuberculous infection in this age period is decreasing. Upon these facts he bases administrative procedures which include: (*1*) care of primary tuberculosis in the home rather than in hospital, (*2*) isolation and treatment of the open cases found, and (*3*) re-X-raying positive reactors annually from ages fourteen to twenty-five. Experience shows that some children with primary lesions develop reinfection tuberculosis in adolescence in spite of prolonged institutional care and in the absence of any known exogenous reinfection. Because of the low incidence of positive tuberculin reactions (8.2 per cent) and inability to trace the source of infection to the home, it is believed that the majority of persons, ages fifteen to twenty-four, have their first infection outside the home during or after the high school age. From a study of 106 persons, ages fifteen to twenty-four, with reinfection tuberculosis since 1928, only 31 cases could be traced to a primary infection in the home, and it is concluded that, if all tuberculous families in a community are known to the health department and contacts properly examined over a period of years, less than one-third of the secondary reinfected cases will be discovered, unless additional case-finding methods are used. Since 1936, 47 per cent of all new cases of tuberculosis under twenty-five years of age were found by routine X-ray follow-up of reactors, and 86 per cent of the pulmonary cases were minimal. The percentage of reactors known to have had household exposure to positive sputum and who developed reinfection tuberculosis was 11.7, while only 1.5 per cent of reactors not known to have had such exposure did so. Reactors showing X-ray evidence of primary lesions appear to develop reinfection tuberculosis in higher percentages than those without such demonstrable lesions. There is no doubt that much reinfection tuberculosis will be found among persons having intimate exposure to open tuberculosis. But early diagnosis among the larger group of young people in school and industry who give no history of intimate contact is a problem. The private physician should lead in a

public health movement to tuberculin test young people repeatedly on a large scale and have the reactors X-rayed. If physicians and young people became tuberculosis-conscious and demanded a far greater use of the X-ray, the proportion of early cases discovered would be greatly increased.—*Tuberculosis among Children and Young People in Cattaraugus County, N. Y., J. H. Korns, Am. J. Pub. Health, February, 1938, xxviii, 167.*—(*S. O. P.*)

Epituberculosis.—This term was first used by Eliasberg and Neuland in 1920 for a type of benign infiltration occasionally met with in tuberculous children. Its salient features are a positive tuberculin reaction and an X-ray shadow of variable size and duration, tending to disappear slowly, leaving no trace. The onset is commonly insidious, the general condition being surprisingly good in view of the large area of consolidation. Early diagnosis is difficult, clinically and roentgenographically, because of the simulation of a chronic or atypical pneumonia. However, O'Reilly (1935) states that tubercle bacilli can be recovered in 40 to 50 per cent of cases. The prognosis is good, the usual course lasting from a few months to a year or two. Although recovery is the rule, miliary tuberculosis or meningitis may supervene. Cameron, in 1936, reported a case dying of tuberculous meningitis, with histologically tuberculous lung tissue in which two acid-fast bacilli were seen and a piece inoculated into a guinea pig produced tuberculosis. In one of Spence's cases (1932) the infiltration was proved tuberculous by recovery of tubercle bacilli by lung puncture. O'Reilly is of the opinion that epituberculous infiltrations are simply particular cases of perifocal infiltration, a phenomenon constantly recurring in tuberculosis, and consisting of inflammatory reaction of an exudative type. Artificial penumothorax, formerly employed on the Continent, has been abandoned and is unnecessary, as is any other active therapy. Two cases are reported, with roentgenographic reproductions.—*Epituberculosis, W. Felter, Tubercle, February, 1938, xix, 218.*—(*A. P.*)

Erythema Nodosum and Pulmonary Tuberculosis.—Most children with erythema nodosum give a positive tuberculin reaction, but its frequency varies somewhat in different countries, for example, 95 per cent in Sweden, 70 per cent in England (Collis, 1931–33–35). This is a much higher incidence than for children in general, which averages about 25 per cent for all ages up to fifteen years, varying according to locality. The suspicion of a connection is confirmed by a careful study of tuberculin positive children with erythema nodosum. About two-thirds show such definite findings as extrathoracic tuberculosis, enlarged hilar shadows, parenchymal pulmonary infiltrations, usually soft and homogeneous in X-ray appearance. Also, in about 50 per cent of cases showing these chest findings, tubercle bacilli can be recovered from the gastric contents—57.7 per cent in children under seven years. This proves that the tuberculosis is active and that the more recent the process the greater the chance of recovering bacilli. Observations have also shown that there is no tuberculin sensitivity before the eruption of erythema nodosum, which appears exactly at the time the child becomes sensitive and this sensitivity persists. Experimental work has shown that tuberculin sensitivity develops in from three to eight weeks after infection and this is just the time when the accompanying fever develops. The conception of erythema nodosum as a nonspecific allergic phenomenon also agrees well with the manner of its appearance in so-called "postprimary" cases, rare among children. In these cases it appeared toward the end of an intercurrent infectious disease, for example, pertussis, at which time the tuberculin reaction, lost during the height of the exanthem, returns. Furthermore, an injection of tuberculin can provoke an eruption of erythema nodosum. The eruption *per se* is nonspecific, as is the histopathology of the nodules. In tuberculin negative cases, tonsillitis and other upper respiratory infections are the most common provocative agents. Collis has suggested that it may be an expression of streptococcal allergy in certain cases. Other aetiological agents are syphilis and *lymphogranuloma inguinale.* Acute rheumatic fever is another, but quite rare, infectious agent.—*Erythema Nodosum and Pulmonary Tuberculosis, A. Wallgren, Lancet, February 12, 1938, ccxxxiv, 359.*—(*A. P.*)

Atelectasis in Children.—During the stage of the primary infection in children, massive atelectasis may occur as the result of bronchial occlusion secondary to hilar lymph node enlargement and is often difficult to differentiate from infiltrative processes. The X-ray appearance of atelectasis, however, is characteristic and establishes the diagnosis. For demonstrating bronchiectasis often associated with atelectasis, the use of lipiodol is recommended.—*Massive Atelektase und Bronchiektasie als Kompli-*

kation primärer Lungentuberkulose bei Kindern, J. Zeyland, Ztschr. f. Tuberk., December, 1938, lxxxi, 209.—(A. B. C.)

Tuberculous Cavity in Infant of Eight Weeks.—In contrast to the rarer congenital tuberculosis, this case presents the usual form of exogenous infection in infants but with unusual termination. There was a typical primary lung complex with cavitation here only, no other foci, and death at eight weeks. Few cases with single foci in the lungs under the age of three months are recorded. The usual picture, owing to the extremely active response of the mediastinal lymph nodes, is one of tremendous glandular activity and widespread dissemination in the lungs, spleen and elsewhere; the primary lung focus may be hard to discern and surrounded by a caseous pneumonia.—*Cavity in an Infant of Eight Weeks, D. Price, Brit. J. Tuberc., October, 1937, xxxi, 269.—(A. P.)*

Exacerbation of Primary Complex.—The patient whose case is reported was a two year old Negro child who was admitted to the hospital with roentgen signs of a healing primary complex in the middle lobe of the right lung. In addition he had chronic purulent otitis media with concomitant cervical adenitis. There was satisfactory progess both clinically and roentgenologically for seventeen months, and then the child developed tuberculous meningitis to which he rapidly succumbed. On postmortem examination there was found extensive excavation in the primary complex in the middle lobe of the right lung, together with encapsulated calcified caseous foci, adhesive and caseous pleuritis right and caseous lymphadenitis of the tracheobronchial nodes. There were also found several tuberculomata of the brain and tuberculous meningitis. It is felt that the primary complex had undergone considerable healing made evident by the calcification and encapsulation. The excavation in the middle lobe was of recent occurrence. In the brain there was a central caseous mass encircled by hyalinized connective tissue; in this, reactivation took place, the capsule ruptured and tuberculous meningitis resulted.—*Exacerbation of a Healing Primary Pulmonary Complex in a Two Year Old Child, H. Green, Quart. Bull. Sea View Hosp., April, 1938, iii, 295.—(A. A. E.)*

Results of Collapse Therapy in Children with Pulmonary Tuberculosis.—There are reported the results of collapse therapy as applied to 105 children with open pulmonary tuberculosis. All had positive sputum and 95 per cent showed cavities by X-ray. The children varied in age from five to fifteen years, and 70 per cent were more than twelve years old. Forty children improved, 33 remained unimproved, and 32 died. Death usually occurred within two years of initiating therapy and was usually due to extension of disease on the contralateral side. The effect of the degree of collapse on the outcome depended in part on the type and extent of lesion; but in general the more complete the collapse the higher the proportion of favorable outcomes. Moderate or large amounts of fluid developed in the course of pneumothorax in 27 per cent of the cases. The fluid was resorbed in only 2 of the 13 cases in which organisms, acid-fast or mixed infections, were isolated from the pleural effusion. Best results were obtained in those patients with unilateral infiltrative tuberculosis in whom a large amount of collapse could be obtained. When the infiltrative lesion had spread to the other side improvement was much less likely. Children with disseminated tuberculosis occasionally improved with small amounts of collapse. Internal pneumonolysis was employed with good results in suitable cases; in general it was rarely successful when the adhesions were extensive. Partial thoracoplasty was successful in several children, but extensive thoracoplasty produced such a marked degree of kyphoscoliosis that its usefulness was questioned. As a control to this series of children treated with some form of collapse therapy, 87 untreated children with open lesions admitted to the hospital during the same time period were observed. In the control group 95 per cent died.—*Results of Collapse Therapy in Children with Pulmonary Tuberculosis, M. Siegal & B. Singer, Am. J. Dis. Child., May, 1938, lv, 924.—(M. B.)*

Pneumothorax in Children.—It has become obvious that the criteria for inducing pneumothorax in children must differ in important respects from those considered in making a decision in adults. In adults a slower progression of disease is the rule, despite acute episodes, while in children the onset is more often acute, with termination within a few months or a year or two. As the child's resistive powers are less, the time element is far more important and fibrosis is longer in taking place. The epituberculous type of lesion must be considered and the decision guided by serial X-rays. As the tendency in these cases is toward healing, pneumothorax is not generally indicated. There is, however, a type of more extensive disease which if uninterrupted is apt to spread rapidly and,

unfortunately, is not often seen early. In most of these, artificial pneumothorax should be begun without delay and as soon as there is complete information. In cases that can be watched with less danger, an irregular temperature or rapid pulse, or progression of disease, especially if unilateral, should cause the treatment to be begun. Dense and extensive adhesions seem to be less common in children than adults. The presence or absence of demonstrable cavitation is less important, also. Cases of severe and repeated haemoptysis are eminently suitable if the side of bleeding can be determined, although reactions in such cases may be severe. When the X-ray evidence of involvement is about the same on both sides, Agassiz selects the side on which physical signs are most evident. In many such cases the opposite lung will clear remarkably. Fluid is the commonest complication but not necessarily detrimental. Smaller refills may be given than in adults and complete lung collapse is seldom advisable. Cutting of intrapleural adhesions is less often required. The paucity of time elapsed is a limitation but certainly many supposedly hopeless patients, under treatment one or two years, have been able to lead fairly active lives. In those less advanced, improvement was generally marked and sustained. If the child can be kept well until fifteen or sixteen, his chances materially improve.—*Artificial Pneumothorax in Children, C. D. S. Agassiz, Tubercle, November, 1937, xix, 74.*—(*A. P.*)

Tuberculin Reaction and Shape of Chest.—During the spring of 1936 the chest diameters of 2,723 of the parochial school children of Minneapolis were measured, and these measurements correlated with Mantoux tuberculin tests. An investigation recently made on the incidence of tuberculosis in the various school districts in Minneapolis revealed that there is a very high incidence of tuberculosis among the children from the slums, where the deep chest prevails. It was found that the children who reacted positively to the Mantoux cutaneous test had on the average a definitely deeper type of chest or a higher thoracic index than the children who did not show a reaction. The percentage of positive reactors was practically the same in each group of children, 11.9 per cent. At the ages of seven and eight the proportion of positive reactors was lower for the boys than for the girls. At the age of nine there was almost twice the percentage of positive reactors among the boys as compared to girls. At the ages of ten and eleven there was a higher percentage of positive reactors among the boys, but the difference was not so marked as at the age of nine. At the ages of twelve and thirteen the girls had a definite increase in percentage of positive reactors, whereas the boys tended to show a slight decrease. This study helps to explain why there is such a high incidence of tuberculosis among the poor in the slum districts. The children in the slums are physically underdeveloped. They are not only shorter and lighter but they have on the average a deep, primitive, infantile type of chest, one that has not gone through the normal process of development.—*Correlation of the Positive Reaction to Tuberculin and the Shape of the Chest, S. A. Weisman, J. A. M. A., October 30, 1937, cix, 1445.*—(*G. L. L.*)

Vitamin C in Tuberculosis in Children.—The part played in human physiology by vitamin C is still incompletely understood. It is definitely known that it is essential for the maintenance of normal capillary permeability. Among the effects attributed to vitamin C are the improvement of appetite and the stimulation of growth and glandular functions. Recent investigations indicate that it also plays a part in defensive mechanisms against bacterial toxins. While studies in vitamin C in infectious diseases are quite few, data accumulated suggest that a deficiency may occur in various infections and toxaemias. It is, therefore, reasonable to expect a similar occurrence in active tuberculosis. Such deficiency is suggested in the literature with little evidence in clinical studies. Therefore the twenty-four hour urinary output of vitamin C was routinely determined in a group of 37 children with active tuberculosis. The dichlorophenolindophenol technique was employed. All the children, including a group of 25 normal children used as controls, were served a standard daily diet containing 55 to 65 mg. of vitamin C. The average eliminated was 5.7 mg. in the tuberculosis group and 29.2 mg. in the controls. The former is definitely below the minimum normal figure of 10 to 15 mg., while the latter is higher than normal, indicating that the diet was adequate for a normal child. The low excretion in the tuberculous child points to increased destruction in the body resulting in subclinical C hypovitaminoses. This deduction is supported by the fact that vitamin-C excretion is very low in scurvy, but the amount returns to normal following the administration of an adequate amount of the vitamins to produce clinical cure. Also, similar hypovitaminic states are encountered in other acute and chronic infections. It is concluded that the usual type of diet is inadequate for tuberculous

patients and that an increased amount should be given.—*The Urinary Output of Vitamin C in Active Tuberculosis in Children, Am. J. M. Sc., March, 1938, cxcv, 294.*—(*G. F. M.*)

Vitamin C in Tuberculous Children.—After a study based on 22 tuberculous children between the ages of two and fifteen years in the Sea View Hospital, it was apparent that the ordinary hospital diet was inadequate in maintaining vitamin-C equilibrium. Most of the children showed a drop in the vitamin-C level in the blood during their hospital stay. With a low vitamin-C intake there was an even greater decrease in the amount of ascorbic acid in the blood. The ascorbic acid in the blood rose to high levels after administration of cevitamic acid (50 mg. daily) for four days to two weeks.—*Vitamin C Determinations in the Blood of Tuberculous Children, B. Singer & B. Van Bark, Quart. Bull. Sea View Hosp., January, 1938, iii, 145.*—(*A. A. E.*)

Vitamin C in Tuberculosis.—A study comparing the vitamin-C urinary excretion of a group of tuberculous and normal children, both on approximately the same basic vitamin-C diet, that is, 55 to 65 mg. daily, was made, after which 50 mg. of synthetic vitamin C was added to the daily diet. An immediate rise was noted in the normal group, whereas the tuberculous group, in whom the average basic excretion was 6.4 mg. per twenty-four hours, required an average of 750 mg. in fifteen days to produce a rise in excretion to 10 mg. per twenty-four hours. The maximal output (23 mg. per twenty-four hours) was obtained on the twenty-fourth day after 1,200 mg. had been ingested. Subsequent feeding produced no further increase. Upon discontinuance of the added vitamin, the excretion of the tuberculous group promptly fell to the previous subnormal levels. This study points to hypovitaminosis C in active tuberculosis and suggests increased vitamin-C intake as a therapeutic measure.—*Vitamin C in Tuberculosis. The Effect of Supplementary Synthetic Vitamin C on the Urinary Output of this Vitamin in Tuberculous Children, T. S. Bumbalo & W. W. Jetter, J. Pediat., September, 1938, xiii, 334.* (*Authors' Summary*)—(*M. B.*)

Multiple Cystic Tuberculosis of Bones in Children.—The characteristics of the disease *osteitis tuberculosea multiplex cystica*, as described by Jüngling in adolescents and in adults, are summarized. It is pointed out that the disease occurs also in children. The classification of the disease into types is dispensed with, as each type is merely a different degree of a pathological process and reference to the anatomical location of the lesion is sufficient. The history, physical findings, results of laboratory studies, serial roentgenograms and progress of the disease in a girl of 6 years, in whom the long bones were affected, are reported. The small bones of the hands and feet were involved. In a collection of cases of *osteitis tuberculosea multiplex cystica* in children since 1929, it is seen that the disease process attacked the diaphyses of the long bones and the small long bones of the hands and feet, in combination or separately, with equal frequency. The onset of the disease in children is described as gradual and, in contrast to the onset in adults, as accompanied with few or no localizing symptoms or signs. Toxaemia and fever are usually absent. In the 10 cases collected there were few symptoms referable to the lesions. The cystic lesions of the bone are frequently detected accidentally at the time of taking roentgenograms of other parts. Two-thirds of the patients, including the authors', gave roentgenological evidence of primary pulmonary tuberculosis, probably indicating that the original focus was in the pulmonary region. The cystic lesions in all cases but one tended to heal slowly. There was complete bony repair in two. Treatment consisted of general treatment for tuberculosis or care in a sanatorium, with additional individual symptomatic measures (operation has been beneficial to some adults). It is maintained that differential diagnosis of cystic osseous lesions of doubtful causation should include tuberculosis, syphilis, osteomyelitis, xanthomata, hyperparathyroidism, multiple myeloma, coccidioidal granuloma, leprosy and enchondroma.—*Multiple Cystic Tuberculosis of the Bones in Children, J. L. Law & W. S. Perham, Am. J. Dis. Child., October, 1938, lvi, 831.* (*Authors' Summary*)—(*M. B.*)

Early Pulmonary Tuberculosis.—The author emphasizes that the early recognition and prompt treatment of early pulmonary infiltration, especially as it appears in young people, is a vital and most effective factor in terms of lasting cure and freedom from relapsing disease. The development of the early tuberculous lesion in the lung, often called the early infiltration, may be rather abrupt, or it may be gradual with periods of quiescence. Rapidity of development, however, is one of its common characteristics. Pathologically it is a patch of tuberculous bronchopneumonia, occupying a section of the parenchyma usually not more than 2 or 3 cm. in diameter, sometimes at the apex

but more often just below. The patient has no symptoms or only slight to moderate constitutional ones. Tubercle bacilli are not found in the sputum unless the lesion has caseated and broken into a bronchus, and this is not the condition at the very onset. No age is immune to this development, but the peak of development has been found to be between adolescence and the late twenties. Periodic surveys among grade school pupils have not led to the discovery of many early infiltrations. The early lesion will be discovered in only a small minority of cases unless the disease is viewed as a community problem and organized searches for it are made periodically. Tuberculin testing and X-ray examination of the chest, wisely planned and applied, are indispensable parts of the diagnostic method. The early infiltration may be absorbed almost completely, leaving behind a small scar, or it may spread, become caseated and liquefied at its centre and ulcerate into a bronchus, whence other parts of the lung may become contaminated. Absorption, if it occurs, is slow. The tendency to central caseation is predominant. The rate and extent of formation of secondary lesions vary within wide limits. Acute bilateral tuberculous bronchopneumonia may be set up within a few weeks. More often the extensions occur at irregular intervals, and gradually the case drifts into the confirmed chronic state. The most optimistic observers estimate that as high as 40 per cent of the lesions may heal completely; therefore, it is reasonably certain that the majority of early infiltrations developing in young people progress and undergo excavation if they are not promptly and properly treated. Sufficient information has been accumulated by the pathologists and from a study of pathogenesis in the living to warrant the conclusion that most disabling and fatal tuberculosis originates from the innocent appearing early infiltration. The treatment of the first few weeks is the most important of all. In the case of a person under the age of twenty-five with an early infiltration, the practice at Bellevue Hospital is almost invariably to advise a period of strict bed-rest, lasting from two to four months. The younger the person, the more unstable the lesion is likely to be and the greater the need for prolonged rest. Collapse or rest of the lung by pneumothorax or temporary paralysis of the diaphragm may give the necessary lift to the patient who, on rest treatment alone, does not show definite and steady favorable progress. These measures are not necessary, however, for the satisfactory clinical cure of most early infiltrations. The author has had experience with more than 100 cases in which the lesions were actually early, since previous roentgenograms showed no disease, and observation was possible from one to ten years afterward. Supplemented by consideration of many hundreds of other cases in which the duration and course of the disease was reasonably clear though not always verifiable, the author gives a considered judgment that most of the untreated cases have progressed into advanced disease, while patients treated promptly and with bed-rest at the start have recovered without progression of the lesion in about 90 per cent of the instances.—*The Lasting Cure of Early Pulmonary Tuberculosis, J. B. Amberson, Jr., J. A. M. A., December 11, 1937, cix, 1949.*—(*G. L. L.*)

Chronic Miliary Tuberculosis.—The course of chronic miliary tuberculosis varies widely but 3 groups of cases may be distinguished. The first group resembles the acute form but is of longer duration and is usually fatal within six months. Onset is generally acute, symptoms pronounced, fever persistent, the lesions tend to fuse extensively and acute tuberculous meningitis is the common terminal event. In the second group, life may be prolonged for many years although the average duration is about two years. Onset is usually insidious, symptoms slight, fever inconstant, and remissions occur. In this group, the disease sometimes assumes the course of chronic phthisis. The common cause of death is meningitis but tuberculous bronchopneumonia and progressive toxaemia are often found. In the third group, the disease becomes quiescent or arrested. The majority of cases present an X-ray appearance like that of acute miliary tuberculosis. There is little doubt that these lesions have arisen haematogenously. In the minority of cases the appearance is different and is lymphogenous. There, the miliary tubercles are distributed along the lymphatics producing diffuse fibrosis along the lymphatic channels which accompany the bronchi, bronchioles and pulmonary arteries. This type gives rise to linear or reticular shadows so that a latticed or web-like appearance is seen chiefly in the hilar and perihilar regions.—*Chronic Miliary Tuberculosis, C. Hoyle, J. Roy. Inst. Pub. Health & Hyg., August, 1938, i, 682.*—(*L. F. B.*)

Haematogenous Pulmonary Tuberculosis.—Pulmonary haematogenous tuberculosis is a pulmonary dissemination of bacilli by way of the lesser blood circle mainly, in contradistinction to generalized miliary tuberculosis. It occurs most frequently during childhood and in young

adults who were heavily exposed to tuberculosis during childhood. Repeated attacks are not infrequent. The tubercle bacilli enter the blood-stream from caseating regional lymph nodes, via the lymphatic trunks emptying into the venous angle, and are then distributed from the heart through the lungs by way of the pulmonary arteries. Relatively few bacilli enter the pulmonary venous circulation, eventually to cause disease in distant organs. In the pulmonary parenchyma it causes either an exudative reaction characterized by round cell infiltration, or a productive reaction characterized by large mononuclear cells and giant cells, or a mixture of the two types of reaction. Fibrosis of the interstitial structures is seen early. Haematogenous dissemination may clear without leaving a trace. Or the evolutionary process may gradually lead to the other extreme of conglomeration of tubercles, caseation, softening, liquefaction, excavation, bronchogenic dissemination and eventually phthisis. The patient may die of heart failure due to exhaustion of the overtaxed heart muscle from emphysema and anoxaemia developing because of the fibrosis resulting from repeated disseminations. The red cell sedimentation rate is usually above normal. The tuberculin test may be negative even to 1 mg. of Old Tuberculin but will invariably become positive within a few weeks or within several months. The vital capacity is always lowered, in some cases as much as 50 per cent. Roentgenologically, early haematogenous disseminations show an evenly distributed seeding of nodules varying in size from one to several millimetres, with the greatest density in the upper halves. In the earliest stages the roentgenogram may show a mottled appearance, owing to perifocal reaction around the fine nodules. Periodic roentgenograms of retrogressive lesions show a gradual caudo-apical fading of the infiltrations, the nodules in the upper portions of the lungs persisting the longest. In some cases the fine nodules may become fibrosed or even calcified. Dense invasions of the upper halves of the lungs may lead to heavy fibrosis, appearing as dense shadows symmetrically distributed; the lower halves show increased transillumination due to emphysema. The prognosis is usually favorable, except in the fulminating type, which is fatal in most cases. The differential diagnosis involves consideration of generalized miliary tuberculosis, pulmonary congestion due to cardiac decompensation, miliary carcinomatosis (usually in older persons, with progressive dyspnoea, and probable evidence of carcinoma elsewhere), fungous infections (abundant fungi in sputum, pathogenic on animal inoculation), Hodgkin's disease of miliary distribution (with progressive enlargement of mediastinal lymph nodes), and silicosis (less involvement of upper lung fields, and history). The treatment is almost entirely supportive, on strict bed-rest, with close observation by roentgenograms, or with later collapse therapy for certain progressive developments.—*Hematogenous Pulmonary Tuberculosis, W. A. Zavod, J. A. M. A., November 20, 1937, cix, 1693.*—(*G. L. L.*)

Haemoptysis.—A case with recurrent haemoptysis attributed to a calcified pulmonary focus is reported. X-ray failed to demonstrate any other abnormality and on fluoroscopy wide excursions of the calcified focus during respiration were observed. The haemoptysis, therefore, was explained on the basis of injury to adjacent alveolar walls by the pressure or pull of this calcified focus during respiration. This mechanism is suggested as a possible factor in the production of haemoptysis in cases of silicosis and bullet wounds of the lungs.—*Zur Frage der Entstehungsursache von Lungenblutungen, E. Walter-Regensburg, München. med. Wchnschr., August 19, 1938, lxxxv, 1259.*—(*A. B. C.*)

Tuberculous Cavities.—Large cavities are frequently refractory to collapse therapy. These cavities are not "blocked cavities" inasmuch as they usually contain air under positive pressure and analysis of the gas contained in them reveals an oxygen content higher than that in alveolar air and lower than that in atmospheric air, whereas the carbon dioxide content is higher than in atmospheric air and lower than in alveolar air. The closure of the draining bronchi is only intermittent. In no instance have toxic phenomena been observed because of retention of tuberculous pus secondarily infected with pyogenic organisms. In 7 cases pus from such cavities was examined bacteriologically without finding pyogenic organisms. In 10 patients the cavities were opened and the draining bronchus closed by means of a pedunculated muscle flap. In 6 of these patients the sputum became negative after operation and has remained so for periods up to three months.—*Surgical Treatment of Uncollapsed Large Tuberculous Cavities, P. N. Coryllos, Quart. Bull. Sea View Hosp., January, 1938, iii, 149.*—(*A. A. E.*)

Giant Tuberculous Cavities.—A number of tuberculous cavities increase considerably in size, reaching a diameter of 8 to 10 cm. or more. They are designated as giant cavities and may be divided into

two classes: cavities with positive pressures (tension cavities), and those with pressures equal to that of the atmosphere. A third variety presents pressures alternately positive and atmospheric and behave, in accordance with their pressures, as those in the first and second varieties. Tension cavities are always spherical, have thin walls, usually show marked changes in size, often contain fluid, may disappear spontaneously either permanently or temporarily, and lipiodol or dyes injected into them remain a variable length of time but are finally expelled. Sputum is often negative. They present these characteristics because the draining bronchus is closed. They may change into the second variety in which the draining bronchus is open. In these, the pressure is atmospheric, there is no accumulation of fluid, they do not disappear spontaneously, they present unyielding resistance to collapse, their walls are thick, injected dyes are rapidly expectorated, and they increase steadily in size. Sputum is always positive. The interior of a number of giant cavities was studied on the living patient by means of a cavernoscope. In all cavities having an atmospheric pressure the orifice of the draining bronchus could be seen. Saline solution injected into the cavity remained some time although the bronchus appeared patent. Injection of air, increasing the intracavitary pressure did not expell the saline but the saline rapidly disappeared following suction so that air bubbled from the bronchial outlet, indicating that it was open. Generally, the draining bronchus terminates in the cavity obliquely and explains the ease with which a valve-like action can develop. This explains also the closure of the bronchus when intracavitary pressure increases, and its opening as pressure decreases. The explanation of frequent closure of giant cavities following thoracoplasty, when they have resisted pneumothorax, is that thoracoplasty produces permanent atelectasis with rapid proliferation of connective tissue. The course of a cavity depends upon changes that may occur in the draining bronchus. If it remains open, the sputum remains positive and the cavity gradually increases in size by progressive sloughing of lung tissue, and toxic phenomena will be present. If it becomes closed, the sputum becomes negative and the cavity decreases in size or closes due to absorption of the contained gases. If the bronchus is narrowed allowing ingress of air during respiration but not allowing egress, there can be no marked or permanent changes in the cavity. Very careful bacteriological studies of the contents of tuberculous cavities revealed acid-fast organisms only. A number of giant cavities close following pneumothorax or thoracoplasty and it is believed these procedures should be done first. Phrenic nerve surgery was not beneficial. Closed pneumonolysis was helpful in a number of cases. Extensive apicolysis at the time of thoracoplasty has aided in closing some cases. Attempts were made to obliterate the draining bronchus by the injection of various substances into the cavity and by cauterizing the orifice through the cavernoscope, in several cases, but no closure of the bronchus was obtained. In 12 cases, at the time of revision operation following thoracoplasty, a pedicle muscle flap was sutured into the cavity. In half the cases a negative sputum was obtained but the procedure has still dangerous complications. A detailed bibliography is given.—*Giant Tuberculous Cavities of the Lung, P. N. Coryllos & G. G. Ornstein, J. Thoracic Surg., October, 1938, viii, 10.*—(*L. F. B.*)

Encapsulation of Pulmonary Cavities.—Healing of pulmonary cavities depends upon three principal processes: (*1*) fibrous retraction, (*2*) granulation, (*3*) exclusion by encapsulation. None of these three modes of healing occurs to the total exclusion of the other two for the intricacies of tissue reactions are contrary to the rule, but the predominance of one of these types justifies such a classification. One observes in the course of healing of tuberculous cavities by encapsulation new strands of tissue constituting a thin shell, pliant and absolutely air-tight containing a homogeneous caseous mass of soft consistency. This structure, particularly plastic and often discoid, carries, when it presents itself in the sagittal plane, a clinical and radiological implication as the following observation indicates. A patient presented an ulcero-caseous tuberculous lesion of the left lung which was effectively collapsed for four years by therapeutic pneumothorax. Two years later a new cavity appeared in the right lung occupying almost the entire middle lobe; therapeutic pneumothorax effectively collapsed this lesion when suddenly the old lesion in the left lung reactivated followed two months later by death. Anatomical study revealed the right lung to contain a giant cavity filled with white caseous material. The walls of the cavity appeared smooth and pearly without any break in continuity. On section the wall appeared to be constructed by a continuous dense fibrous wall. The bronchial stump in the immediate vicinity of the cavity showed all the evidences of a fibro-angiomatous bronchitis with

subtatal obstruction. The coincidence of complete bronchial involvment with the transformation of a vast aerated cavity into an airless caseous mass, tightly moulded in a fibrous envelope, is noted. This can be stated as the transformation of an active open cavity into a tuberculous, closed, completely inactive cavity.—*Au sujet des cavernes pulmonaires récemment quéries par enkystement, G. Derscheid & P. Toussaint, Arch. méd. chir. de l'app. respir., 1938, xiii, no. 2, 115.*—(*J. E. F.*)

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